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No. 178

House of Representatives

AIRPORT CONGESTION

(Mr. BINGHAM (at the request of Mr. EDWARDS of Louisiana) was granted permission to extend his remarks at this point in the RECORD and to include extraneous matter.)

Mr. BINGHAM. Mr. Speaker, it has long been apparent that the air traffic situation in the New York-New Jersey area becomes more dangerous and overcrowded, and creates more inconvenience and delay for the passengers being served with each passing month.

During the last session of Congress, I made the suggestion that all private aircraft be banned during peak hours from airports such as the National Airport here in Washington.

I was pleased to see that the November 1967 issue of *Travel* magazine contained an editorial which, among other suggestions, made a similar proposal, and I insert it in the RECORD for the information of my colleagues:

NATIONAL TRAVEL CLUB EXECUTIVE LETTER
(Travel proposes four steps to help alleviate perilous—and rising—airport congestion)

Topped by the Presidency, government agencies, private industry and both House and Senate committees are currently engaged in a vast reappraisal of America's enormously expanding air traffic. Today's and tomorrow's lack of facilities present crushing problems that demand urgent solutions. For example, of the 575 airports with scheduled air carrier stops in the U.S., only 111 of them have radar service.

Congestion at airports is another mounting problem, as any air traveler can testify. Part of this problem is created by a surprising source: private planes. At New York's Kennedy International Airport, 31 per cent of the peak-hour traffic is made up by these private craft. Their clearances, for take-offs and landings, are as precise and time-consuming as for a passenger-laden jetliner.

Equivalently, it is like letting the *Queen Elizabeth II* idle in the Hudson River while two people pull their private yacht into the shared pier. So planes, despite good weather, stack up at their allotted levels, and perhaps well back from their destinations. Obviously, the dangers are inherent, the ground crews overworked, the time lost incalculable. But by 1970, the 2,300 commercial planes across America will number closer to 3,500, and private craft are expected to increase in use from the current 100,000 to double that number. At the 22 key U.S. air cities, the congestion will inevitably be fantastic—unless action is taken now.

Travel firmly believes that certain immediate steps should be taken to benefit the traveling public now.

Establish some form of compulsory arbitration above politics to settle federal-state disputes regarding expansions and new sites. Vacillation for the past four years has prevented even selection of the locale for New York's urgently needed fourth jet airport.

Computerize more precisely, and study more closely, arrival and departure schedules, on an all-industry basis, to eliminate conflicts. At present, flight schedules can inherently cause jam-ups on the ground as well as in the air.

8. Make more extensive use of take-off delays at departure points when the weather is bad at the destination. It is far safer to wait in a terminal for weather clearance than to spend the same amount of time circling in a fog.

None of these recommended procedures call for vast outlays of money or special appropriations, and each can be put into practice quickly.

H. W. SHANE,
President.

Adopted by FAA 1/15/69

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December 1970



Advanced Programming

by **Harry Katzan, Jr.**
Pratt Institute

a book that will significantly
improve your chances
for advancement in
the computer field

a message from the Director of The Library of
Computer and Information Sciences

In our continuing search for new and useful books for members, our editors are constantly on the lookout for books of an advanced nature. Needless to say, the number of such books is small as compared to the flood of books on elementary aspects of the computer sciences.

Therefore, it is with no little pleasure that I tell you that this month's Main Selection is **ADVANCED PROGRAMMING**, by Professor Harry Katzan, Jr., of the widely respected Pratt Institute in Brooklyn, New York.

This new book represents the first unified treatment of such advanced programming topics as assemblers, compilers and syntactical methods; string manipulation and list processing; computer languages and operating systems.

If you are already familiar with at least one higher-level programming language such as FORTRAN or COBOL and have a working knowledge of an operating system, **ADVANCED PROGRAMMING** will significantly improve your chances for advancement in the computer field.

Last year at this time we offered to members a selection of books specifically chosen for their attractiveness and usefulness as gifts. Once again the holiday season is almost upon us and, if you are like I am, perhaps there is a special gift for which you have been searching. Why not browse through the selection of colorful gift books available this month? I am sure that you will find it a painless method of solving your gift problems.

One final word: It's not too late to order your copy of the 1971 **INTERNATIONAL REFERENCE DAY BOOK**, a remarkably useful desk aid and reference book for office or home.

I extend to every member my very best wishes for the holiday season and the year to come.

Robert F. Scott

The Main Selection

Advanced Programming

by Harry Katzan, Jr.

When an industry is growing as rapidly as that of computers is, it takes a lot of mental running just to *keep up* with new developments. In order to *move forward* in such an explosively expanding "world," whether you are programmer, designer, analyst, or manager, it is necessary to "run" even faster.

ADVANCED PROGRAMMING can provide the very sort of high-octane boost you have been looking for: If you are familiar with one of the higher level programming languages (FORTRAN or ALGOL, for example) and possess reasonable mathematical maturity (a formal background in mathematics and science is most emphatically *not* called for), there will be no more effective aid available today to improve your chances for advancement in the computer industry than Professor Harry Katzan's remarkably lucid, concise, and thorough new book.

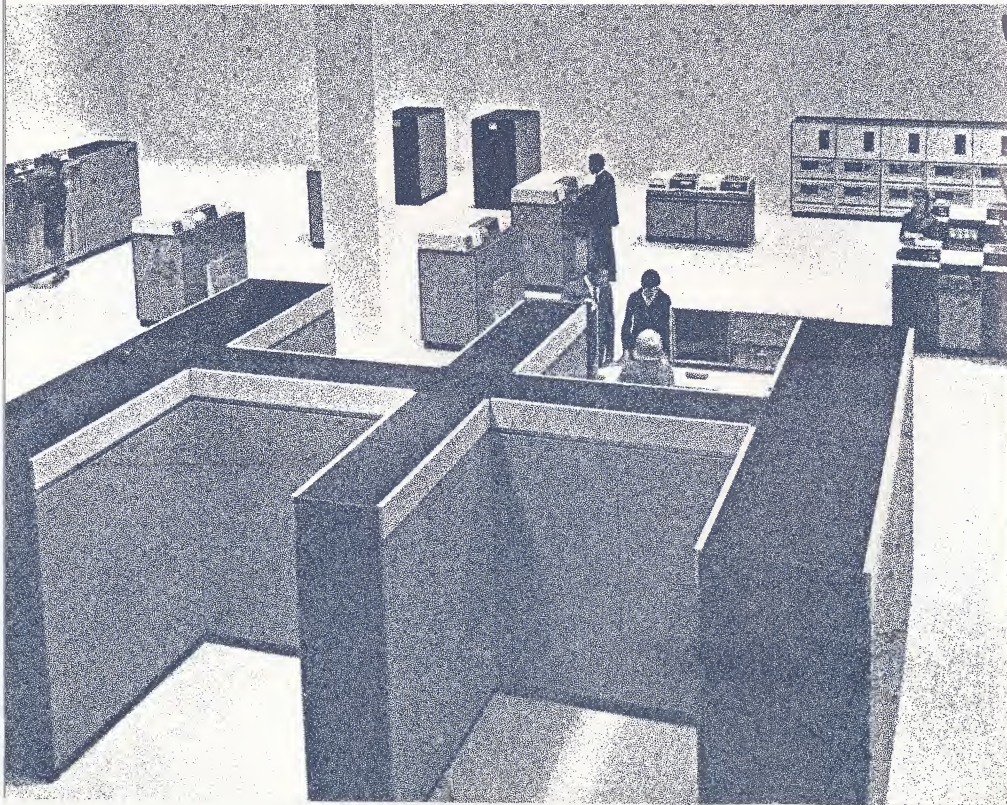
As the title implies, this is not a work for the raw neophyte. Neither, however, is it restricted to the high-powered specialist. Rather, the author has provided one of the most up-to-date, incisive, and complete expositions of programming theory and techniques currently on the market.

Among areas treated with exceptional brilliance in this just-published volume are:

- **Assemblers** Full insight is given into the functioning of the assembler as a translator of symbolic instructions into machine in-

structions. Special attention is paid to the construction and use of symbol tables, a subject of great general interest.

- **List processing** A deep understanding of the nature and manipulation of various types of lists, such as inventory tables, symbol tables, queues, and files, is provided through an outstandingly clear analysis of their general properties and the application of programming languages (LISP, PL/1) in processing them.
- **Compilers** Both basic methods and advanced systems are covered. Topics include Polish notation, FORTRAN, and stack compilation. Conversational and incremental compilers—concepts vital to efficient use of time-sharing systems—are discussed in depth.
- **Time-Sharing** This is the “hottest” subject in the computer software field. Time-sharing is a technique designed to provide many users with simultaneous access to a central facility. The author reduces the concept to its essentials, then considers details, among them time allocation schemes (time slicing, demand, natural wait), virtual storage, dynamic address translation, paging, and resource sharing.



ADVANCED PROGRAMMING is arranged into two major sections. The first, *Programming Systems*, is described as “the core of the material.” It covers assembler programs and symbol tables, string manipulation and the SNOBOL language, basic compiler methods, grammars, syntax representation, syntax encoding and recognition, syntax-checking algorithms, list processing concepts, the LISP language, list processing in PL/1, computer language structure, macros, compile-time facilities in PL/1, advanced concepts in compiler design, and decision-logic tables.

The second portion of the book, *Operating Systems*, supplements and provides background for the first. It contains material on the structure of operating systems, the user environment, the structure and operation of control programs, time-sharing systems design philosophy including a discussion of the various types of systems, virtual memory and paging, and the sharing of programs and data.

One can list two outstanding qualities of ADVANCED PROGRAMMING: *clarity* and *unity*. For the first, we can thank the author’s uncanny ability to uncover the basic elements of a concept—Professor Katzan seems to have that rare, apparently effortless knack, of getting directly to the heart of an idea, no matter how complex it might be, with the least fuss and in the fewest words.

The unified structure of the book—it contains the first coordinated treatment of the structure of operating systems—is clearly the result of the author’s extensive computer background, his teaching experience, and a great deal of thought and effort directed toward organization.

In addition, this work possesses an outstandingly clear prose style, dozens of highly useful diagrams, figures, and tables, many valuable end-of-chapter problems and references, and a top notch index. All-in-all, here is a work which is profound in subject yet amazingly readable.

Whether for self-instructional use by computer personnel on the way up or as a reference and handbook for those already there, ADVANCED PROGRAMMING will be an invaluable acquisition.

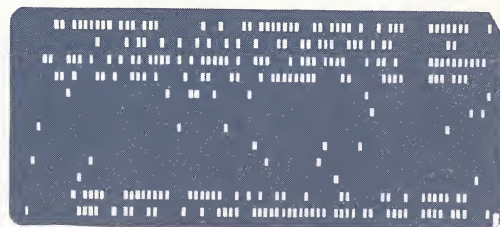
About the Author

Harry Katzan, Jr. is Assistant Professor of Computer Science at the School of Engineering and Science at Pratt Institute in Brooklyn, New York. He has also held positions at the IBM Corporation, Oak Ridge National Laboratory, and the Boeing Company.

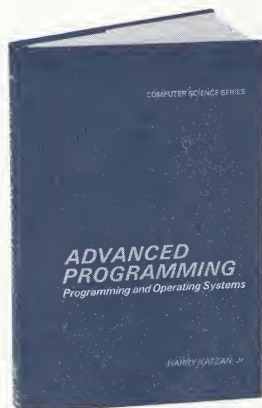
Professor Katzan is a member of the Association for Computing Machinery, the American Association of University Professors, and the American Management Association.

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The Main Selection



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Programming and Operating Systems

by Harry Katzan, Jr.

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Alternate Selection

Semantic Information Processing

Edited by Marvin Minsky

Artificial intelligence—the programming of computers to engage in behavior which is unquestionably “intelligent” in the human sense—is no longer a writer’s fantasy or a mathematician’s hypothesis, but a hard engineering reality.

In his landmark volume, SEMANTIC INFORMATION PROCESSING, Marvin Minsky, head of The Massachusetts Institute of Technology’s Artificial Intelligence Group, takes the reader on a fascinating and amazingly varied tour of the latest in cybernetic programming.

Here is a selection of experimental programs created by seven of the nation’s foremost cyberneticists, and directed toward the development and analysis of intelligent machines. The results set forth are truly eye-opening.

Thus, Daniel G. Bobrow’s STUDENT program and Thomas G. Evans’ ANALOGY, rival the abilities of the average high school student, while the reasoning capacities of Bertran Raphael’s SIR (Semantic Information Retrieval) program and Fisher Black’s question-answering system, can be compared closely to children on the grade school level.

Before the 1950s—before the advent of electronic digital computers—the testing of theories dealing with artificial intelligence was forestalled by the physical deficiencies of the technology. Yet when the basic tools started to become available, many of the less adventurous began objecting to the very concept of machines indulging in spheres of creative mental activity previously reserved for humans.

In SEMANTIC INFORMATION PROCESSING, Dr. Minsky meets objections from humanist quarters head on. “One must learn to be suspicious of

arguments of the form 'computers can prove theorems, but they cannot do well at, say, the art of music,'" he notes.

What is needed for a computer to write good music is simply a good *semantic model*, Professor Minsky says, adding that there are already programs which can write better music than most of the world's human population. The lack of semantic models—of cogent specifications of musical excellence—stems, says Dr. Minsky, "from the fact that most esthetic analysts wax indignant when it is suggested that it might be possible to understand what they are trying to understand."

Analytic criticism in the arts may be in a "disgraceful state," as Professor Minsky says, but his field most assuredly is not. In *SEMANTIC INFORMATION PROCESSING* he demonstrates the youthful vitality of this frontier area of computer programming by rounding up the premier contributions of some of America's top cyberneticists. The result is a volume of perhaps epochal importance—essential reading for *everyone* interested in the ultimate capabilities of the high speed digital computer and its corollary uses for information storage and retrieval, mechanical translation, and problem-solving.

Some highlights from this trail-breaking book:

• **Semantic Memory** (*M. Ross Quillian*) asks the central question: What constitutes a reasonable view of how semantic information is organized within a person's memory? In other words: What sort of representational format can permit the "meanings" of words to be stored in a computer so that humanlike use of these meanings is possible?

The author shows how a computer memory can simulate the human capability for comparing and contrasting the meanings of two words. He also shows how the computer can collect data about the process by which a text is understood when it is read.

• **Programming with Common Sense** (*John McCarthy*) deals with the problem of representing within a formal and logical system a variety of familiar ideas, such as causality and potentiality that everyone "understands without effort" but that had never been suitably mechanized. Included are the author's "*The Advice Taker*" and "*Situations, Actions, and Causal Laws*." The latter has been widely circulated and discussed but has never before been published.

• **Descriptive Languages and Problem Solving** (*Marvin L. Minsky*) analyzes the need to be able to make abstractions in symbolic language so that computers can prove theorems, play games, etc. The author concludes that "in order for a program to be capable of learning something it must first be capable of being told it."

Contents

Preface 1. **Introduction, by Marvin L. Minsky** Artificial Intelligence and its Cybernetic Background • The Period between 1955 and 1962 • Formality • Generality • Learning • Knowledge • Grammar, Syntax, and Parsing Programs • Machine Translation of Languages • How Much Semantic? • Relevance and Structure • Practical Problems of Mechanizing Large Models 2. **SIR: A Computer Program for Semantic Information Retrieval, by Bertram Raphael** Semantic Information Retrieval Systems • Representations for Semantic Information • SIR Treatment of Restricted Natural Language • Behavior and Operation of SIR • Formalization and Generalization of SIR 3. **Natural Language Input for a Computer Problem-Solving System, by Daniel G. Bobrow** Semantic Generation and Analysis of Discourse • Programming Formalisms, and Language Manipulation • Transformation of English to the STUDENT Deductive Model • Storage of Global Information • Solution of Simultaneous Equations 4. **Semantic Memory, by M. Ross Quillian** The Role of Semantic Memory • The Memory Model • Use of the Memory Model in a Simulation Program • The Memory Model as Basis for a Theory of How People Comprehend Language • Some Final Implications and Relations to Linguistic Theory 5. **A Program for the Solution of Geometric-Analogy Intelligence Test Questions, by Thomas G. Evans** The Complete Solution Process: Two Examples • Analogy • Results and Discussion 6. **A Deductive Question-Answering System, by Fischer Black** Statement, Question, and Answer • Deduction • Stopping Endless Deduction • Avoiding Endless Deduction • Examples • Efficiency 7. **Programs with Common Sense** The Advice Taker • Situations, Actions, and Casual Laws 8. **Descriptive Languages and Problem Solving, by Marvin L. Minsky** The Need for Analysis 9. **Matter, Mind, and Models, by Marvin L. Minsky** Knowledge and Models • Models of Models • Dimorphism of our World Models • The Central Argument: Belief in Dualism • Heuristic Value of Quasi-Separate Models • Interpreters • Free Will **Subject Index • Name Index**

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The development of the high-speed digital computer has precipitated—along with its profound impact on the process of data handling—a vigorous burst of interest in the techniques, effectiveness and utility of *numerical analysis*.

This powerful collection of mathematical tools, long the analytical workhorse of the “applied” mathematician, has been dramatically expanded in scope and capability as a result of the computer revolution. Computer-assisted numerical analysis is now being put to work in a large number of exciting ways:

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The subject inspires such loving treatment. The very names of Europe's medieval castles—Bodiam, Caernarvon, Tarascon, Schönbürg, Chillon, Castel del Monte—move the imagination as little else can. And in an astonishing series of photographs, taken in eleven countries, Wim Swaan has captured the essential atmosphere of Europe's castles, from the great square keep of England's twelfth century Richmond to Switzerland's delightful Aigle, a magnificent example of late-Gothic architecture.

CASTLES OF EUROPE is one of the most inviting books available today. Opening it is like stepping into the vast hallway of one of the great structures so beautifully described on its pages. One soon wants to explore further, to savor in the imagination what it must have been like to live in shadows of those great walls or within those high-domed chambers and cold towers.

As a possession on your library shelf, *CASTLES OF EUROPE* will gather no dust because you and your guests will seldom allow it to rest there. As a gift, it is, quite simply, unsurpassed. But there is one word of caution: if you plan to give this book away, don't look through it first. If you do, chances are you will have to buy another one because you will want to keep it for yourself.

On the cover: left, Karlštejn in Czechoslovakia; right, *Carradale*, a four-masted barque

Only an old sea dog can imbue a narrative with the true spirit of sailing and the scent of salt air; only a devoted researcher can provide a deep sense of history; and only an expert writer can fashion a vast mass of facts and graphic material into a dramatic, gripping, and connected story.

Captain Donald Macintyre, well-known author of books on naval lore and a former career officer in the British Royal Navy, has all these qualities. His book, *THE ADVENTURE OF SAIL 1520-1914*, is the happy result of this combination of erudition, enthusiasm, and talent.

This is a visually exciting book, packed with illustrations (forty-four are gloriously big, full-color plates) including old maps, etchings, photographs, and paintings of sailing ships and the hard, strong men who manned them. With these pictures and a fascinating collection of historical documents written by such famous naval figures as Sir Francis Drake, Captain James Cook, Horatio Nelson, and Joseph Conrad, Captain Macintyre unfolds a stirring tale of storms, shipwrecks, and battles; of heart-pounding episodes of bravery and shameful incidents of cowardice.

The great sailing vessels of the past are no more but the continuing adventure they represented lives on in the dawning space age, with its similar adventures of the human spirit, discernible not only in great voyages and moments of danger, but also in the discovery of new techniques.

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An early American frigate in full sail



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The word is *beautiful*—no other word will do because no other book has ever achieved the brilliant, shimmering, three-dimensional beauty of the color reproductions in this revised, enlarged, and recently reissued classic. And in all of nature, no form of life or inanimate object is more worthy of such loving photographic care than these living jewels of the insect world.

No bird, no precious gem, no tropical fish, no star ever gleamed with more glorious iridescence than the South American Butterfly *Morpho cypris* or flashed more gaudily than the *Callithea saphira* or flaunted such unique symmetry of form and patterned color than the giant Madagascar moth, *Argema mittrei* with its tailed wings of gold and yellow.

In all, some 200 of the most beautiful species, many of them rare African, South American, and Asian varieties, are represented in the gorgeous, over-sized color plates which form the entire second half of BUTTERFLIES AND MOTHS. But besides these, the revised edition now includes thirty-six additional large, full-color photographs of *Lepidoptera* (from the Greek words for scale and wing) in their natural habitats. These new pictures form part of the extremely informative, lucidly written, and delightful text which provides the reader with a short course in the history, value, and biology of the two sub-orders of *Lepidoptera*: *Rhopalocera* (butterflies) and *Heterocera* (moths).

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South African butterfly *Acraea anacreon*

Picis ceryne, a Niger River butterfly



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On the cover: Microphotograph of part of wing of the moth *Chrysiridia madagascariensis*

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INTRODUCTION BY ALFRED WERNER: MEET THE LEPIDOPTERA • BEAUTY ON THE WING • THE IMPORTANCE OF APPEARANCE • THE TRAVELLER • GEMS OF THE TROPICS • IN POETRY, ART AND LORE

Developmental Stages of Butterflies by Josef Bijok

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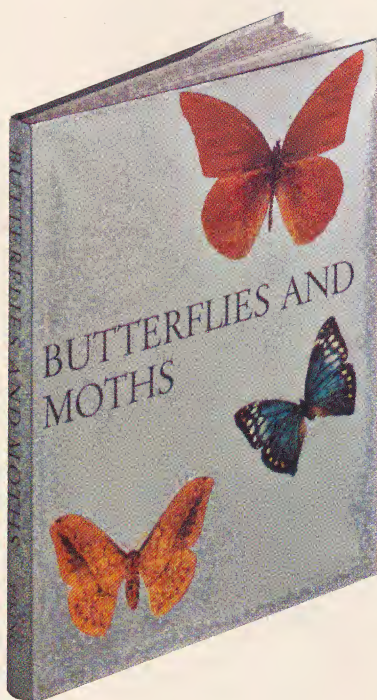
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The Hidden Sea

A Sequel to
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BENEATH the surface of the sea a world of beauty lies hidden from all except those who deliberately seek it out, a universe which until recently was almost totally unknown, even to the most daring adventurers.

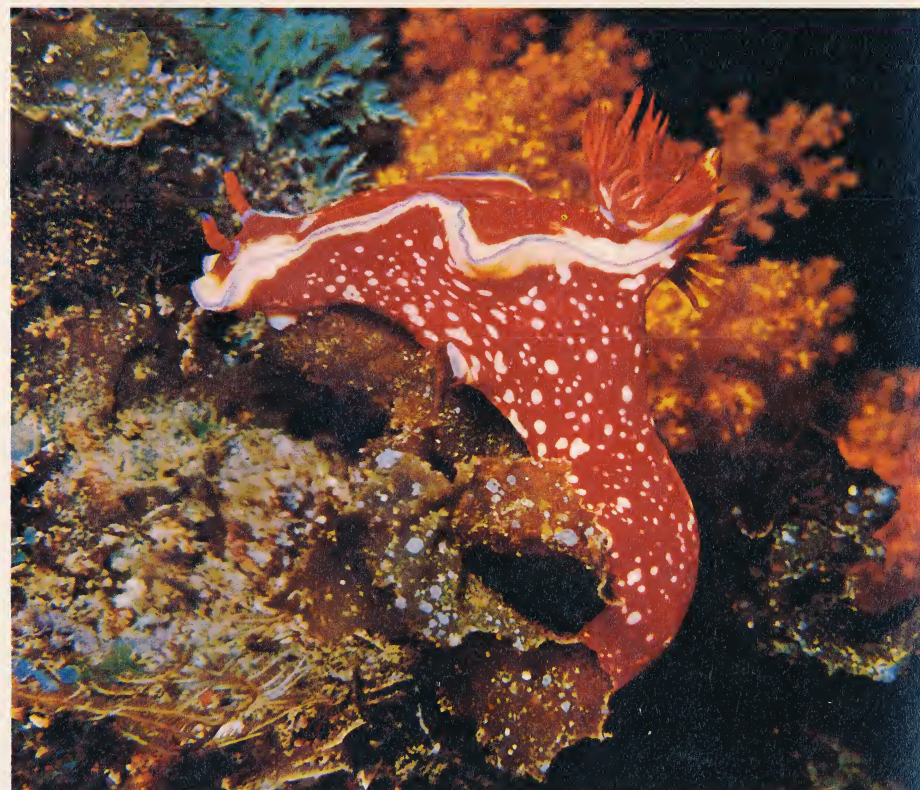
In *THE HIDDEN SEA*, the just-published sequel to last year's highly successful *The Hidden Forest*, Douglas Faulkner's remarkable photographs are combined with a fascinating and authoritative text by Dr. C. Lavett Smith of the American Museum of Natural History, to give every one of us a glimpse into the magnificent landscape beneath the ocean's surface, with its infinite variety of life forms.

Seventy-eight full-page and double-page color gravure reproductions offer the reader an unequalled opportunity to examine in detail the color, form, and texture of strange and exquisite aquatic organisms whose habitats range from the coast of Maine to the Great Barrier Reef of Australia. Every picture has been carefully selected. Each shows the animal in the full beauty of its natural setting. While the pictures can be enjoyed for their beauty, the written portion of *THE HIDDEN SEA* increases that enjoyment by supplying information about the animals themselves, just as a libretto adds to our understanding of an opera, and therefore to our pleasure and appreciation of the fine music.

Thus, Dr. Smith explains the structure of the marine community, the close interrelationship of plant and animal life, and man's responsibility to maintain the delicate balance of an ecological system upon which we are so dependent and from which we derive so much benefit. "To a well-trained and cautious diver," Dr. Smith says, "the dangerous marine animals are actually less dangerous than the mountain lions, rattlesnakes, and briar patches of the land. In the sea, as on land, the most dangerous animal is man."

In our world, we are fond of thinking that things must be either functional or beautiful, and all too often usefulness is given preference over esthetics. Yet in the highly competitive world of the oceans, where the slightest disadvantage may spell the difference between survival and extinction, there is no contradiction between beauty and practicality.

THE HIDDEN SEA is a breathtakingly exquisite book, big and superlatively colorful. It is an enlightening book with a great appeal for anyone who wishes to learn more about the undersea world and who loves nature and is concerned about its preservation. But it is also a significant book because it teaches us that utility need not be bought only at the expense of form—that beauty and function, far from being inimical, can exist in perfect harmony.



The Men Behind THE HIDDEN SEA:

C. Lavett Smith has been the Assistant Curator of the Department of Ichthyology at the American Museum of Natural History in New York City since 1962. He is an expert on the taxonomy, ecology, morphology, and distribution of Cenozoic fishes. Dr. Smith received his Ph.D. in 1959 from the University of Michigan.

Douglas Faulkner is a well-known photographer. His pictures have appeared in *Life*, *Holiday*, *National Geographic*, *Venture*, *Du*, *Camera*, and other leading publications.

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1. THE HIDDEN SEA 2. SPONGES 3. CORALS 4. MOLLUSKS
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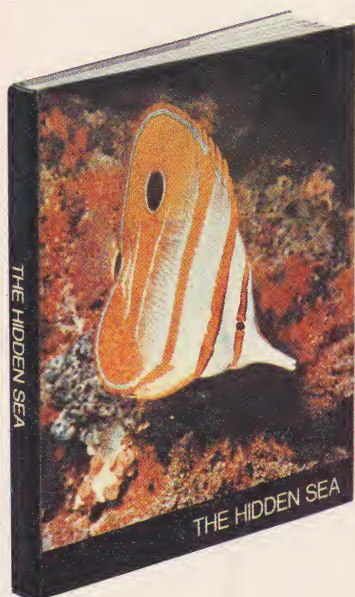
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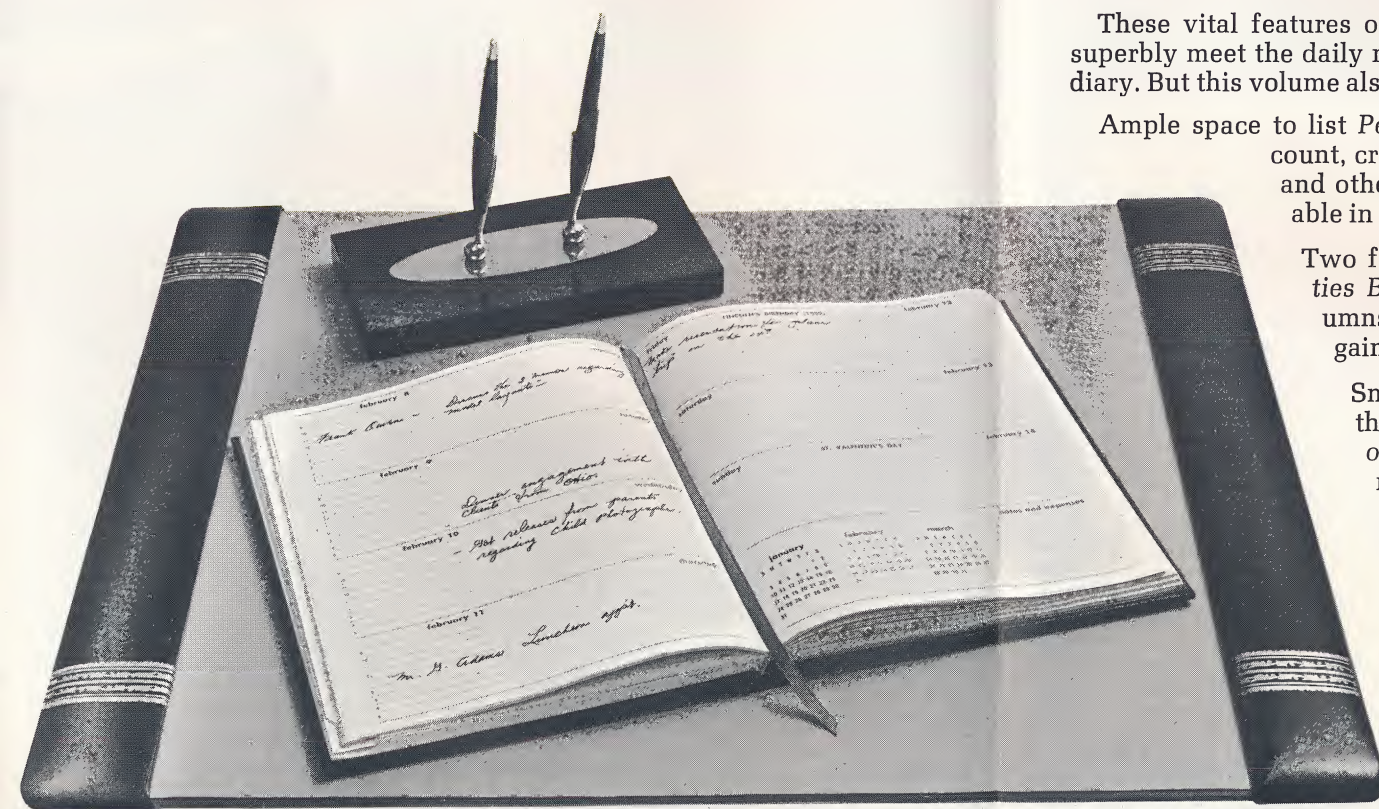
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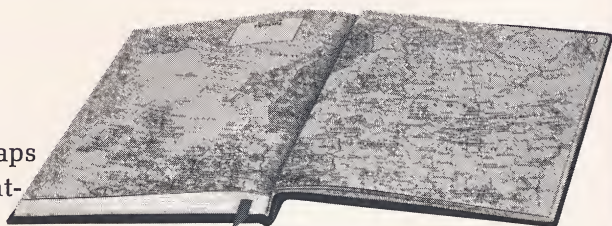
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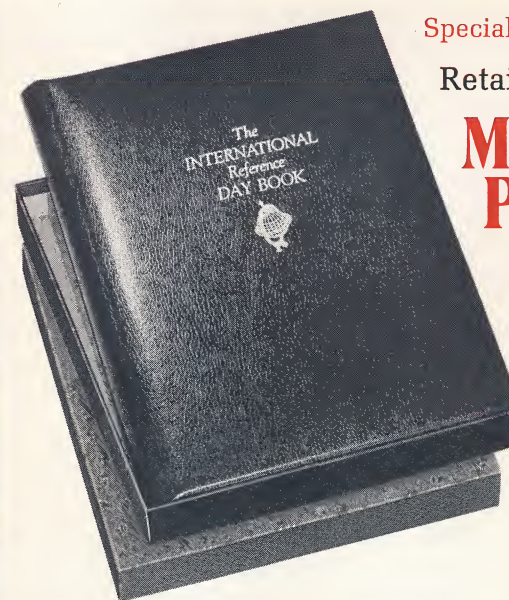
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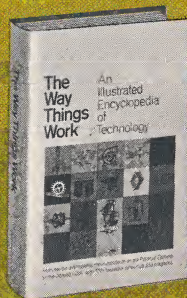
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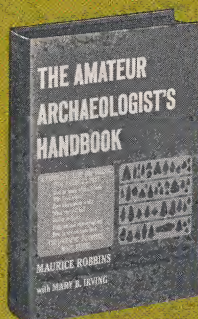




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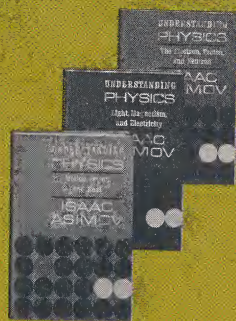
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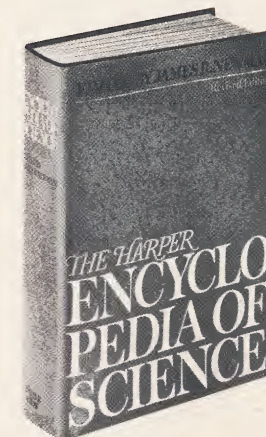
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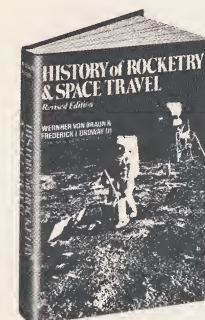
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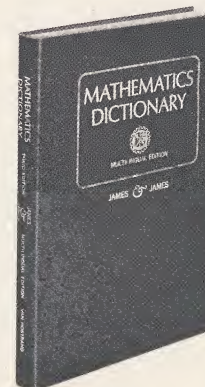


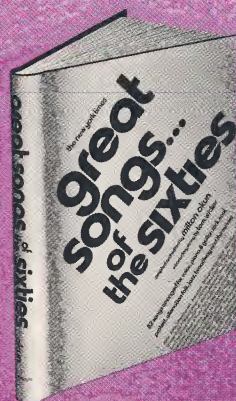
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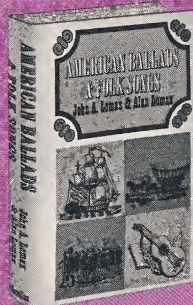




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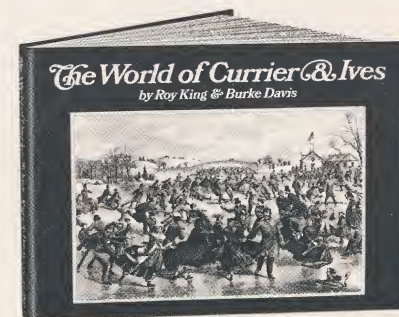
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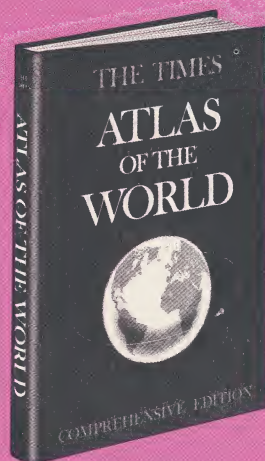


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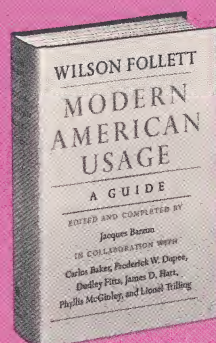




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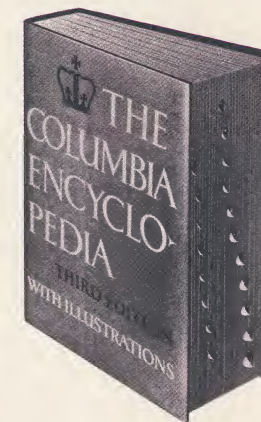
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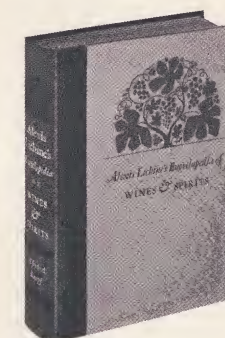
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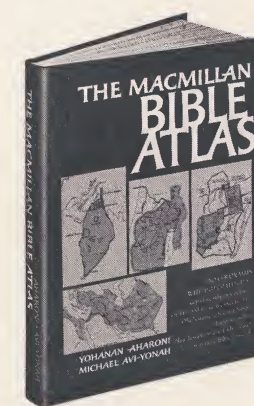
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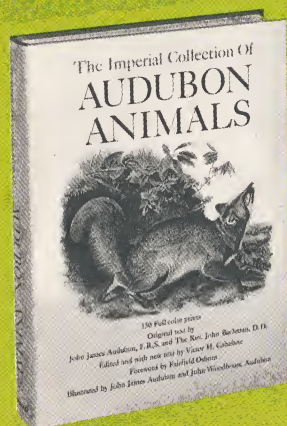
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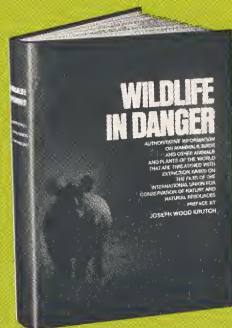
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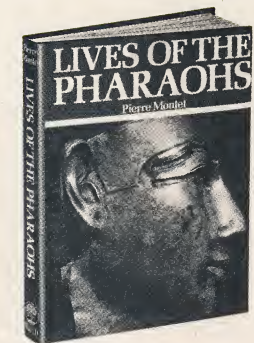
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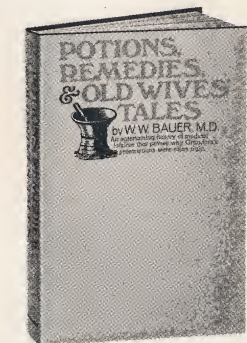
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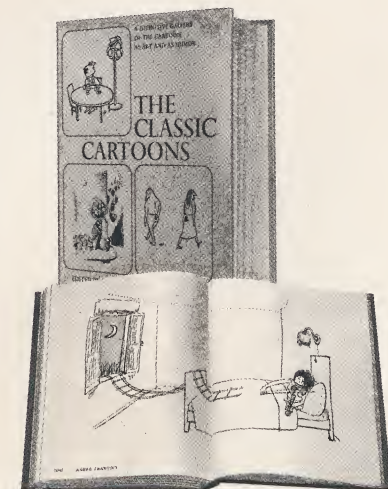
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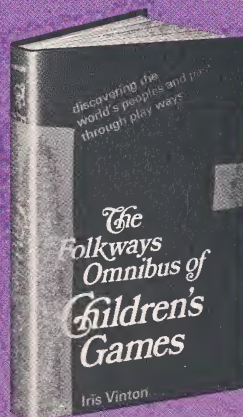
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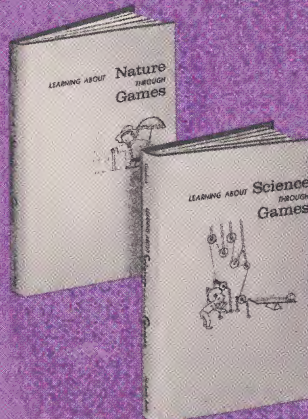
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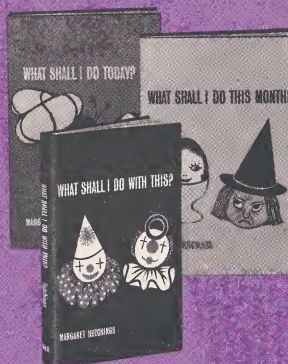
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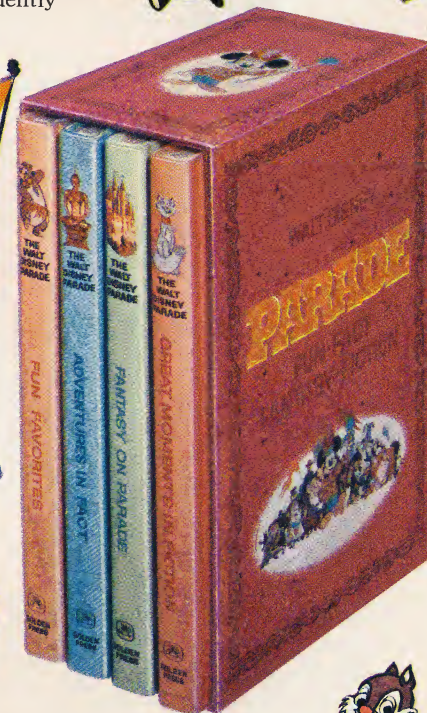
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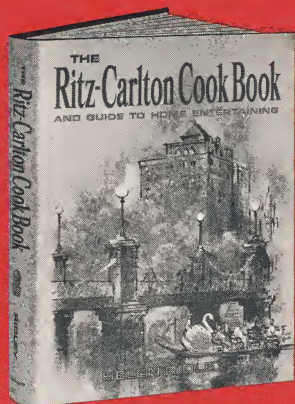
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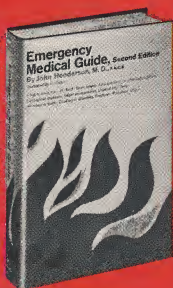
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